Impact Of Utilization Of Computer As An Instructional Material In The Teaching And Learning Of Geometry In Senior Secondary School Mathematics In Bauchi State Of Nigeria.

[1]Abdu Adamu Gambaki, [2]Bashir Sule

[1]Curriculum And Instruction Department, Aminu Saleh College Of Education, Azare, Bauchi State.
[2] Mathematics Department Aminu Saleh College Of Education, Azare, Bauchi State

ABSTRACT: The research investigated the impact of computer as an instructional material in the reaching and learning of geometry in senior secondary schools Mathematics in Bauchi state. It addressed two research questions and two hypothesis using experimental and control group designs. The samples comprised of senior secondary schools year II (SS II) students from schools selected from forty-two (42) secondary schools in Katagum Zonal Education office, Azare of Bauchi state. The schools were randomly assigned to Experimental Group (EG) (Geometry) and Contest Group (CG). A validated 10-items Geometry Achievement Test (GAT) with interval consistency reliability of 0.05 significant level of confidence was used to measure the students' achievement before and after the treatment. The Data collected was analyzed using mean and standard deviation to answer the research question whereas T-test was used to test the research hypothesis, student's gender had no significant effects on the teaching and learning achievement when computer as an instructional material was used. Based on the findings, some recommendations that would bring about improvement and innovations were made for teachers and students school ministries of education authorities and government agencies.

KEYWORDS: *Effective, Utilization, Computer, Instructional Materials, Geometry, Mathematics.*

I.　　　INTRODUCTION

In the present time, the nations of the world are being classified as "developed and developing" based on their progress and advancement industrially, technologically and most importantly educationally to provide better standard of living.

Agina-Obu, (2005) submitted that instructional materials of all kinds appeal to the sense organs during teaching and learning. Isola, (2010) also described instructional materials as objects or devices that assist the teachers to present their lessons logically and sequentially to the learners. Oluwagbohunmi and Abdu-Raheem, (2014) acknowledged that instructional materials are used by teachers to aid explanations and make learning matter understandable to students during the teaching learning process. According to Josua, in Abiodun-Oyebanji and Adu, (2007) instructional materials are all things that are used to support, facilitate, influence or encourage acquisition of knowledge, competency and skills. Doreen, et al., (2007) stressed that it is any form of specific mathematical apparatus (Structured or unstructured), image, Information and Communication Technology (ICT) game, tool, paper, or everyday material which could be utilized to provide an effective mathematical teaching or learning.

Odili, (1990) stated that, many people emphasized the importance of instructional materials in promoting meaningful Mathematics instruction. Unlike physics, chemistry, biology and Mathematics instructors suffered in the past for lack of special instructional devices. In their own study, Olumorin, Yusuf, Ajidagba and Jekayinfa (2010) observed that instructional materials help teachers to teach conveniently and the learners to learn easily without any problem. They asserted that instructional materials have direct contact with all sense organs.

Fakomogbon, (2000) also reported that instructional materials possesses the quality of influencing the psychological, motivational and structural position of the learners. It aids the achievement of attention and motivation; orderliness in the classroom; lesson presentation; recall and remembering; guidance, active participation and response; feedback, assessment of performance and evaluation in the teaching and learning process.

However, industries and industrialization are science based, the study is the key to the scientific concept altitude and technological progress. Here Mathematics occupies an important position as it's essential in all facets of scientific and technological endeavors. More so, Mathematics in Nigeria occupies a central place in secondary schools and all students offer Mathematics. But the important instructional materials cannot be over emphasized.

Statement of the problem

The secondary school Mathematics curriculum is designed in a way that it can be reviewed in order to meet the dynamic growth of the society. Many researches have been done either separately or collectively on teachers behavior ahnd learning of Mathematics. But little attention was given to the importance of instructional materials in teaching and learning Mathematics in secondary schools. Therefore, this study attempts to find out some prospects attached to the use of computer as an instructional material in the teaching of Mathematics in secondary schools.

Purpose of the study

This study is set to determine whether the use of computer as an instructional material will improve significantly students' achievement in Mathematics. Specifically, the study sought to:

1. Investigate the impact to which the use of computer as an instructional material improves the performance of students in Geometry.
2. Find out whether teachers will be encouraged to use computer as one of the best instructional materials for teaching and learning Geometry.
3. Investigate or examine students' responses after application of instructional materials.
4. Finding best ways of using computer for instruction.

Research questions

1. Is there any significant difference in the mean achievement score of students taught using computer as an instructional material and those taught without computer in Geometry?
2. Is there any significant difference in the mean achievement score of male and female students taught with computer as an instructional material in Geometry?
3. What role does computer play in the teaching and learning of Geometry in Mathematics?

Hypotheses

1. There is no significant difference between the performance of students taught with computer and those taught without computer in Geometry.
2. There is no significant difference between the performance of male and female students taught with computer in Geometry.

Significance of the study

The findings of this research will be of utmost value and importance to secondary school teachers and students, educational administration, stakeholders and curriculum planners. It serves as guide to teachers, trainers and trainees in reassessing their techniques, strategies, improvise and methods for teacher to preparation when coming to the class. The study would help to develop keen interest in the subject as it enhances their performance in not only Geometry but also in other branches and aspects of Mathematics and the science in general.

II. METHODOLOGY

The study is an experimental design which employed the use of pre-test and post-test control group. In this design two groups are involved, experimental group and controlled group. The population of the study comprises of one hundred and twenty (120) SS II students in all the forty two (42) Senior Secondary Schools in Katagum Zone, Bauchi state. Three (3) Senior Secondary Schools out of the forty two (42) were selected using simple random sampling. Twenty (20) SS II students (10 boys and 10 girls) from each school were randomly chosen, and were assigned as experimental and controlled groups. Hence a total of sixty (60) students formed the sample of the study. The researchers taught experimental group for three weeks using computer as teaching aid and controlled group without computer. Then the Geometry Achievement Test (GAT) was administered to both the two groups. The teaching consists of seven items, covering all the variables in the research. Whereby we taught a topics in Mathematics (Geometry) for three days and conduct an assessment test. Re-teach the topic within the period using different teaching aids and conduct another test. The reliability test was carried out on the three min level/classes of the teaching experimenting groups, that is level of use computer on an instructional materials. Data collected was analyzed using mean and standard deviation to answer the research questions whereas t-test was used to test the research hypotheses.

III. RESULTS

Research Question 1

What is the difference in the mean achievement score of students taught using computer as an instructional material and those taught without computer in Geometry?

Table 1: **Comparison of mean achievement score of students taught Geometry using computer as an instructional material and those taught without computer**

	Group	N	Mean	Std. Error Mean	Std. Deviation	Mean Difference
MAT	Experimental	30	37.53	1.148	6.290	10.23
	Control	30	27.30	1.056	5.784	

Table 1 shows the mean difference in the achievement of students taught Geometry using computer as an instructional material and those taught without computer. The Table revealed that the mean score of students in Experimental group (37.53) is greater than those in control group (27.30). The Table also revealed that the mean difference of 10.23 exists between the two groups.

Research Question 2

What is the difference in the mean achievement score of male and female students taught with computer as an instructional material in Geometry?

Table 2: **Comparison of mean achievement score of male and female students taught Geometry using computer as an instructional material**

	Gender	N	Mean	Std. Error Mean	Std. Deviation	Mean Difference
MAT	Male	34	31.62	1.393	8.120	1.84
	Female	26	33.46	1.500	7.648	

Table 2 shows the comparison of mean achievement score of male and female students taught Geometry using computer as an instructional material. The Table revealed that the mean score of female students (33.46) is slightly greater than that of the male students (31.62). Also, the mean difference between male and female students taught Geometry by the aid of computer was found to be 1.84.

To establish if the differences observed in the mean scores are significant or just occur by chance, two research hypotheses were formulated and tested at 0.05 level of confidence using t-test statistical analysis.

Testing of Research Hypotheses

Hypothesis 1

There is no significant difference between the performance of students taught with computer and those taught without computer in Geometry.

Table 3: Summary of t-test analysis of achievement scores of students taught Geometry using computer as an instructional material and those taught without computer

	Group	N	Mean	Std. Deviation	df	t-cal	t-crit	P-value	Remark
MAT	Experimental	30	37.53	6.290	58	6.559	1.67	0.000	Significant
	Control	30	27.30	5.784					

Significant at P≤0.05

Table 3 shows the summary of t-test analysis of achievement scores of students taught Geometry using computer as an instructional material and those taught without computer. The Table revealed that the p-value (0.000) is less than 0.05 level of confidence. In other words, the t-calculated of 6.559 observed, is greater than 1.67 of the t-critical. Therefore, the hypothesis is rejected. This implies that there is a significant difference between the performance of students taught with computer and those taught without computer in Geometry. It can be observed that students in the experimental group (37.53) performed better than those in the control group with a mean difference of 10.23 in favour of students in Experimental group. The implication of this is that, students understand the concept of Geometry better when taught with computer as an instructional material.

Research Hypothesis 2

There is no significant difference between the performance of male and female students taught with computer in Geometry.

Table 4: **Summary of t-test analysis of achievement scores of male and female students taught Geometry using computer as an instructional material**

	Gender	N	Mean	Std. Deviation	df	t-cal	t-crit	P-value	Remark
MAT	Male	34	31.62	8.120	58	0.894	1.67	0.375	Significant
	Female	26	33.46	7.648					

Significant at P≤0.05

Table 4 shows the Summary of t-test analysis of achievement scores of male and female students taught Geometry using computer as an instructional material. The result from the analysis revealed that there is no significant difference between the achievement of male and female students taught using computer as an instructional material in Geometry. This is due to the fact that the p-value of 0.375 is greater than 0.05 alpha level of confidence. However, the hypothesis is not rejected. This implies that the teaching of Geometry with the aid of computer as an instructional material is not gender bias.

IV.   DISCUSSIONS OF FINDINGS

The results of table 1 indicates that the two groups were at slightly different entry level regards to their academic ability before the teaching was presented to them. Hence, there were no much significant differences in their test mean and score. This findings agrees with the earlier finding of Gambaki, (2012) Kenneth (2009) "effects of virtual laboratory on the achievement of Secondary School Students in physics and effects of computer as an instructional materials in teaching and learning.

The results of the data analyzed in table 2 showed that the experimenting group taught with computer as an instructional material with mean achievement of (37.53) achieved higher that the control group taught with use of computer with mean achievement of 27.30. This implies that there was a difference in the mean achievement of students taught utilizing computer as an instructional material and those taught with traditional method.

The results in table 3 further revealed that difference between the mean achievement of the experimental group and control group was statistically significant (t-cal 6.559, df 58, P. value 0.05) Thus hypothesis I was not rejected. This means that the instructional materials are on computer for geometry had enhancing effects on the teaching and learning of Mathematics.

The results in table 4 further revealed that the differences between the achievement of the male and female (EG and CG) was statistically significant (t-cal 0.894, t-erit 1.67, P. value 0.375). This justified that from the analysis that there is no significant different between the achievement of male and female students taught utilizing as an instructional materials in Geometry. This hypothesis 2 is not rejected.

The significant achievement of the students taught with computer as an instructional materials over those taught without it could be explained by the fact learning through practice of computer is the key to acquisition of knowledge. When a student is instructed verbally there is the tendency to forget knowledge that is audio-visual aids remembrances. This support the findings of Nsofor and Akpomedaye (2012) who stated that instructional materials of which computer tools are inclusive help teacher to teach more efficiently and also enable the students to learn more effectively. This is also in agreement with Igyu (2005) and Kennoth (2009); Gambaki (2017); Gambaki and Auwal (2016); Ema and Ajayi (2009); Naomi (2012) who all noted/cited that there was no much appreciable difference between the achievement of the EG and CG in the research work.

The result of the data analyzed as contained in table 4 proved that there was no significant difference between mean achievement scores of gender taught utilizing computer as an instructional materials. This finding indicated that computer as an instructional material has enhancing effects on the teaching and learning of Mathematics concepts for examples Geometry.

V.   CONCLUSION

On the basis of sample evidence available and research findings in this research, the researchers can hereby conclude that students taught with computer performed better in geometry that students not taught and as such, the use of computer should be employed in teaching Mathematics for efficient and effective learning and performance of the students.

Recommendations

On the basis of the findings from this research, the following recommendations are made:
1. All Mathematics teachers should learn how to prepare a Computer Assist Instruction (CAI) to facilitate leaning.
2. The ministries of both Federal and State level should organize in-house training on the importance of using computer.
3. State government and private schools should equip the schools with desktop computers to facilitate teaching and learning Mathematics.
4. Students should be exposed to computer literacy as it was stipulated in the National Policy on Education (NPE).
5. To improve teachers students understanding and better achievement in geometry. More particular, teachers should be aware of the role of computer in teaching and learning in classroom and hence, make the use of computer available in teaching of the classrooms.

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